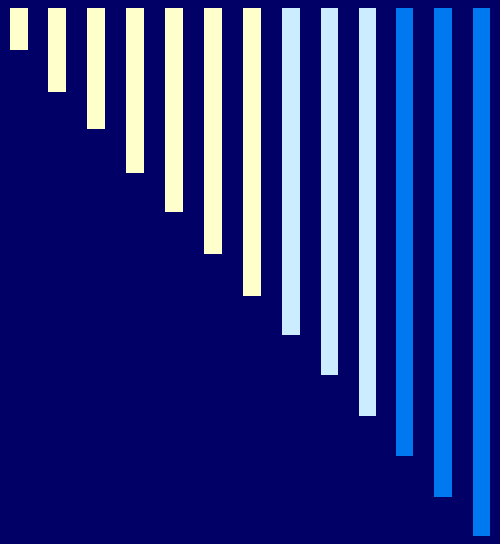

BEST MANAGEMENT PRACTICES FOR WATER CONSERVATION

PRESENTATION BY

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WATER RESOURCES MANAGEMENT CONFERENCE

April 18, 2006

INTRODUCTION

- Encouraging water conservation
- Water Teams
- Simple Technologies
- Advanced Technologies
- Applied Research

WATER CONSERVATION PLANS

CREATE WATER MANAGEMENT TEAM:

Teams consist of people at points of major water usage.

- Supervisors
- Operators
- Management

CRANSTON PRINT WORKS, CO.

CPW's Water Conservation Team:

- Formed by employees from different departments
- Identified 25 water conservation projects

CPW achieved annual savings:

- Over 110 million gallons of water
- Over $350,000

WATER CONSERVATION PLANS

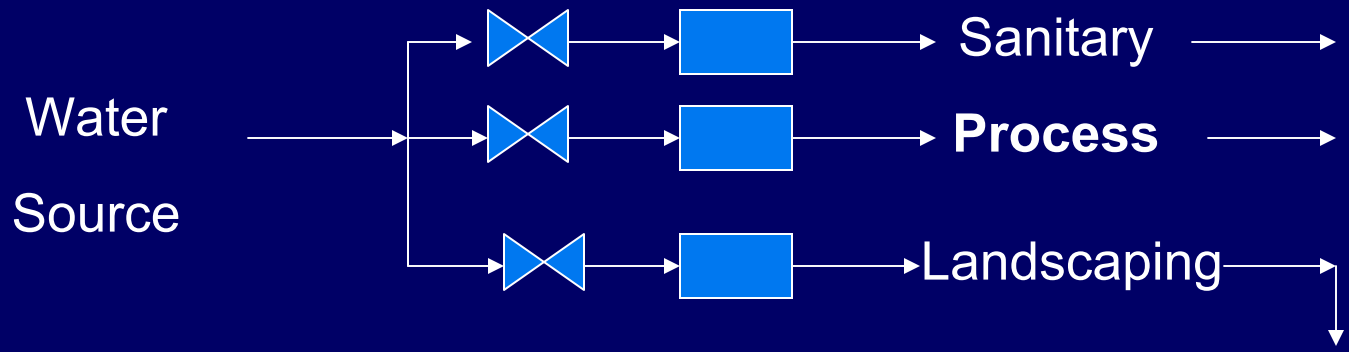
Management must make a clear policy statement.

- Everyone should participate in water conservation.
- There is a cost to water consumption just as there are for other raw materials.

WATER CONSERVATION PLANS

THE TEAM WILL:

- Break the flow into three sections
- Install Flowmeters



The COST value of water will be based on use in PROCESS

THE NEED FOR MEASUREMENT

Success = Measurement of flow before and after changes.

- To monitor water consumption install water flow meters and totalizers.
- Develop a flow baseline.
- Portable meters are often useful when there are numerous measuring points.

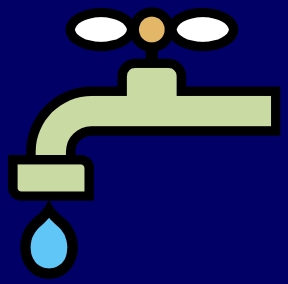
SIMPLE CONSERVATION METHODS

Physical cleaning methods can be used alone or to complement aqueous cleaning solutions

These include:

1. Baking soda blasting
2. Dry Ice blasting
3. Steam cleaning
4. Compressed air cleaning

SIMPLE CONSERVATION METHODS

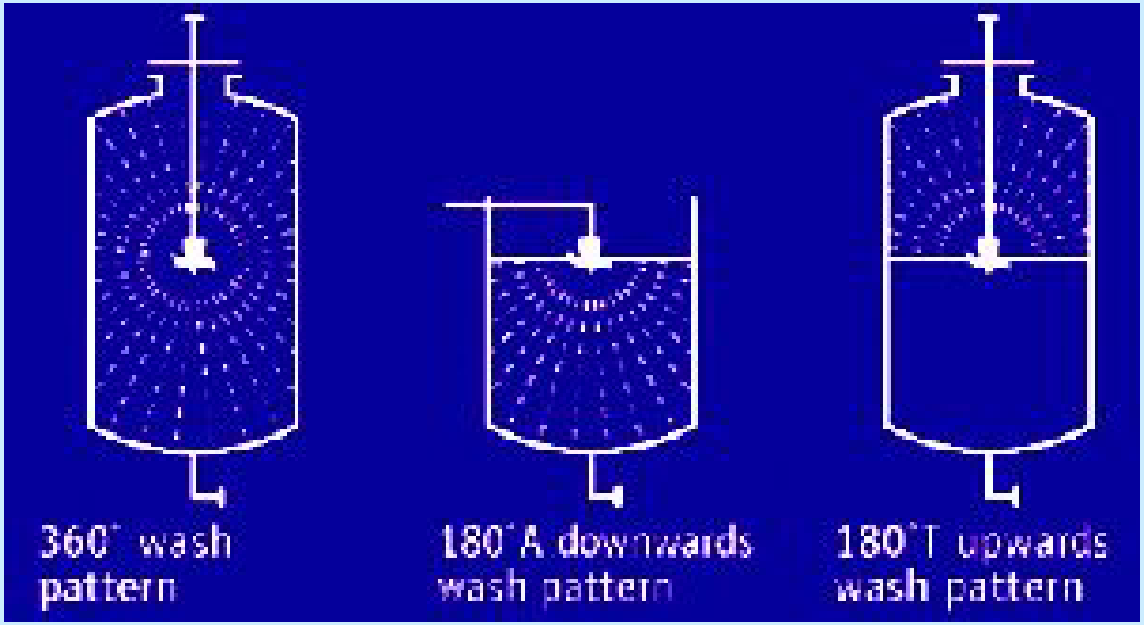


Identify Leaks in the Water Supply System

Main causes of leaks include:

A. Damaged pipeline connections flanges and fittings
B. Worn valves
C. Flooded floats (balls) on water tank or cistern valves
D. Corroded pipe work and tanks

AVAILABLE PRACTICES FOR REDUCING CONSUMPTION



Automated Clean-in-Place (CIP) systems, for cleaning pipes and tanks, control and optimize water use.

AVAILABLE PRACTICES FOR REDUCING CONSUMPTION

The Automated Clean-In-Place System:

- Uses a microprocessor to ensure the optimum concentration of the recirculating cleaning agent.
- The spray ball used to clean the tank walls utilizes less water than filling the tank to overflowing to rinse the inside walls.

AVAILABLE PRACTICES FOR REDUCING WATER CONSUMPTION

Use Countercurrent flow in the rinsing process.

- For Countercurrent flow the item to be rinsed should travel from the dirtiest rinse tank to the cleanest water tank.

Spray rinsing with low-flow and appropriate high pressure nozzles.

- Can reduce rinse-water use up to 60% compared with counter-current immersion rinsing.

AVAILABLE PRACTICES FOR REDUCING WATER CONSUMPTION

- All companies should aim for close-looped systems, i.e. reuse all the water used in the process.
- Some companies have had success at this using Membrane Systems.
- The membranes are used for:
  - Microfiltration – 1 micron = 10^{-3} millimeters
  - Ultrafiltration – 0.01 – 0.1 microns = 10^{-5} to 10^{-4} mm
  - Nanofiltration- 0.001 – 0.01 microns=10^{-6} to 10^{-5} mm
  - Reverse Osmosis – Angstrom units

CASE STUDY – CLOSE LOOP
Columbia Mfg.

Columbia Manufacturing, Westfield, MA

- Reduced fresh water consumption by 150,000 gal/day.
- Zero discharge using a vacuum distillation units to treat segregated waste water streams.

APPLIED RESEARCH

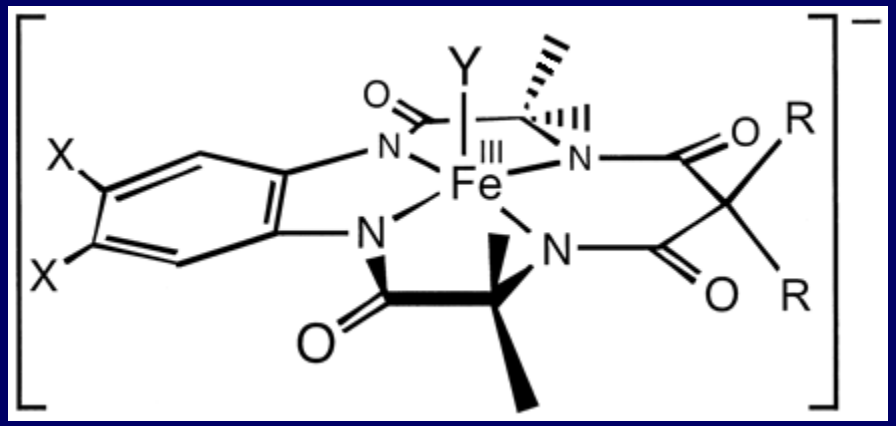
PAPER & TEXTILE INDUSTRIES

- Fiber is carried by the water which makes up over 99% of the volume.
- After separation, Water is reused as much as possible. It is dumped when it is not useable due to inappropriate color.

METHODS TO REDUCE COLOR

- A patented activator (TAML ®) and hydrogen peroxide are used to remove colorants. This method is in the testing phase
- Granulated Activated carbon is being tested as another method of removing colorants.

TAML® by Carnegie Mellon University



Fe-**T**etra**A**mido **M**acrocyclic **L**igand[1]

- reactive and very selective
- water soluble, non-toxic,
- stable between pH 1 – 13
- low dosage, 0.1 - 4 ppm

SUMMARY

- Water Conservation ranges from simple methods such as repairing leaks and physical blasting, to membrane filtration and countercurrent rinsing and color removal.
- OTA & consultants can assist in water conservation by conducting facility audits to identify areas where water can be conserved.
- For more information contact OTA at: www.mass.gov/envir/ota or at 617-626-1060